

Home Safety Assessments/Interventions in American Indian Homes: A Role for IHS Engineering Staff

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Abstract

This study examines the feasibility of conducting a home safety assessment/intervention program for American Indian families in Northern California as part of the Indian Health Service (IHS) Sanitation Facilities Construction (SFC) Program. Currently, the SFC Program develops, improves, and provides sanitary water supplies and wastewater disposal facilities to Indian homes in an effort to reduce environment-related disease. As part of a typical project, engineering technicians spend several hours at each home site, evaluating the feasibility of supporting water supply or wastewater-disposal facilities. During the site evaluation, the technician often experiences "down time" that can be directed toward other tasks like a safety assessment without additional salary cost to IHS.

For this study, engineering technicians were trained to identify injury risk conditions in the home environment. A one-page assessment/intervention survey was used to record the absence or presence of smoke detectors, fire extinguishers, carbon monoxide detectors, fire safety plans, fall hazards, water heater temperature risks, poison storage, and so forth. As part of the intervention, technicians installed smoke detectors, fire extinguishers, and first-aid kits in participant homes that lacked this equipment.

Between April and December 1998, the study assessed 109 homes. The prevalence of homes with a working smoke detector rose from 58 percent to 96 percent. The prevalence of homes with a mounted working fire extinguisher rose from 33 percent to 98 percent. The prevalence of homes with a first-aid kit rose from three percent to 99 percent. The amount of time needed for the assessment/intervention ranged from five minutes to 45 minutes, with an average of 18 minutes per site.

Traditionally, IHS engineering staff have not been involved in preventing injuries. The results of this study, however, indicate that IHS engineering staff can conduct a home safety assessment/intervention program in conjunction with normal duties. Because injuries are the second leading cause of death for Indian people, other IHS and SFC programs should consider implementing home safety assessments as part of their mission to raise the health status of American Indians and Alaska Natives to the highest possible level.

Introduction

In 1997, unintentional injuries and deaths occurring in the home cost \$99.9 billion in the United States. The rate of deaths caused by unintentional injury in the home was 10.6 per population of 100,000. Injuries in homes are the second leading cause of unintentional injury deaths, exceeded only by motor-vehicle crashes. More disabling injuries take place in the home than in motor-vehicle crashes and workplace accidents combined. In 1997, about one person in 13 experienced a home injury resulting in medical attention or requiring one-half day or more of restricted activity (1). Most unintentional injury deaths of children younger than five years of age occur in the home (2). Among American Indian people, unintentional injuries (excluding motor-vehicle injuries) are the third leading cause of death (3).

There are several reasons to try to incorporate home safety assessments and interventions into an existing Indian Health Service (IHS) program. In an era of government reduction and funding cutbacks, providing the same level of service with fewer resources—or additional services with the same resources—becomes increasingly important. Home safety checklist intervention programs have been found effective in reducing hazards that cause home injuries (4). Furthermore, the National Safety Council recommends conducting safety inspections in homes twice a year (5). Among Indian homes in Northern California, there is a need for a home safety assessment/intervention program to improve injury prevention practices in home environments. The Indian Health Service (IHS), however, has limited Injury Prevention Program (IPP) resources.

This study examines whether IHS can conduct a home safety assessment/intervention Program in conjunction with the usual Sanitation Facilities Construction (SFC) Program operated under Public Law 86-121, using the existing SFC Program staff with negligible additional demands on resources such as money and time.

The Existing SFC Program

The SFC Program develops, improves, or provides sanitary water supplies and wastewater-disposal facilities to Indian homes in an effort to reduce environment-related disease. These sanitation projects include community facilities as well as projects that serve

FIGURE 1

"IHS Environmental Health Home Assessment" Form

IHS ENVIRONMENTAL HEALTH HOME ASSESSMENT

NAME _____ ADDRESS _____
DATE _____

DATA:

of Children in home _____ # of smokers in home _____ # of people 60 yrs+ in home _____
Type of heat in home _____ Assessment time _____ Min. Travel time _____ Hrs.
Type of home: NEW BIA-HIP DHUD CDBG LIKE-NEW EXISTING

FIRE

- ☐ Operable **smoke detector** per bedroom and each floor _____ IHS installed ☐
- ☐ ABC type **fire extinguisher** _____ IHS installed ☐
- ☐ **First Aid Kit** + _____ IHS installed ☐
- ☐ **Emergency ☎ numbers** posted (Fire/Police/Ambulance/Poison Control) _____
- ☐ **Carbon Monoxide Detector** _____
- ☐ **Fire safety plan** (posted w/ exits, and meeting place—periodically discussed w/ family/babysitter) _____
- ☐ **Periodic fire drills** _____
- ☐ At least one working **flashlight** _____
- ☐ Chimneys, stovepipes, heating systems periodically cleaned
- ☐ Furnaces, fireplaces, hotwater heaters, space heaters, heat ducts clear of any obstructions and with adequate ventilation _____
- ☐ No overloaded electrical circuits, no frayed electrical cords, no electrical cords under rugs or furniture _____
- ☐ Matches, lighters, flammable liquids (in proper containers) stored away from heat and out of reach of children _____
- ☐ **House number** and/or name clearly posted at driveway/entrance/mailbox _____
- ☐ Driveway **access**/turn around for **emergency vehicles** (>20' wide, > 15' high, no sharp turns or locked gates) _____
- ☐ Location of nearest **fire hydrant** (visible?) _____
- ☐ Brush, dead grass, dead wood cleared >30' around home _____
- ☐ **Water heater** temperature <120° F to prevent scalding _____

Child Considerations

- ☐ Medicines, cleaners, alcohol, matches, guns, insecticides, knives, razors, etc. locked up (remember kitchen, bathrooms, garages, basements) _____
- ☐ **Car seat** for the car _____
- ☐ **Bicycle helmets** _____
- ☐ Fall hazards _____
- ☐ Safety covers on electrical outlets _____
- ☐ Curtain and blind cords out of child's reach _____
- ☐ Household plant names known for poison control information (leaves out of reach) _____
- ☐ Lead paint/plumbing fixtures/pipe? _____

COMMENTS:

Homeowner Initial: _____ Date: _____ IHS Staff Initial: _____ Date: _____

scattered individual homes. The IHS staff identify sanitation deficiencies, determine the feasibility of providing facilities, design facilities, construct sanitation facilities, provide technical assistance, and provide training. The California Area Indian Health Service (CAIHS) has provided sanitation facilities for more than 15,000 homes. The SFC program has played a significant role in preventing environment-related disease. The age-adjusted gastrointestinal disease death rate for American Indians has decreased 80

percent in the last 25 years from 6.2 to 1.4 per 100,000 population (6).

In the course of a normal project that serves scattered homes, engineering technicians visit each home site, evaluating the feasibility of supporting water supply or wastewater disposal facilities. The elements of an evaluation include determining property status; verifying standard house eligibility requirements (plumbing, heating system, electrical, etc.); soil sampling; making test pits; administering percolation tests; survey-

TABLE 1**Pre-Intervention Conditions of Homes**

Injury Prevention Item	Homes (n = 109)	Percentage of Homes
Working smoke detectors	63	57.8
Nonworking smoke detector	15	13.8
Fire extinguisher	36	33.0
Dedicated first-aid kit	3	2.8
Posted emergency phone numbers	35	32.1
Carbon monoxide detector	6	5.5
Posted fire escape plan	11	10.1
Electrical hazard	35	32.1
Visible house number	72	66.1
Emergency-vehicle access	83	76.2
Available fire hydrant	57	52.3
Brush cleared in 30' radius around home	87	79.8
Water heater temperature set at less than 120°F	52	47.7

ing the site; testing water bacteria; interviewing the homeowner; and generating a site map. Such activities may take several hours per site. In addition, simply reaching many of the sites involves several hours of travel. IHS personnel also return to each site during construction and training. The technicians often spend time waiting for homeowners to fill out paperwork, for percolation test holes to perc, or for completion of various phases during construction inspection. This is called "standby time."

Methods

Home Safety Assessment/Intervention

The 20-minute IHS Environmental Health Home Assessment Form was developed for use in conjunction with SFC Program site evaluations (Figure 1). This one-page assessment/intervention tool helps identify injury risk conditions in the home environment, including the absence or presence of smoke detectors, fire extinguishers, first-aid kits, carbon monoxide detectors, fire safety plans, safe storage practices or hazards, and water heater temperature risks.

The IHS assessment form was created by compiling numerous checklists and home hazard concerns named by local counties, foster care agencies, Internet articles, and

home safety texts. This four-page list then was refined and edited into its simple one-page form, which covers selected safety issues. The purpose of honing the list in this way was to ensure that the assessment/intervention could be performed within the 20 minutes specified by the study hypothesis. Nearly all the items on the form were physically verifiable in the home environment (i.e., hot water temperature), while self-reported behavior measurements (i.e., child never left alone in bath) were kept to a minimum.

Assessment/intervention results were discussed with each homeowner. As part of the assessment/intervention, smoke detectors, fire extinguishers, and first-aid kits were installed in participant homes that lacked this equipment. Photoelectric smoke detectors were installed because they provide optimal protection from smoking-related fires; while nuisance alarms caused by cooking occur at a lower rate than with other types of smoke detector (7).

Since IHS personnel spend several hours at each sanitation project site, it was suggested that a 20-minute injury prevention home assessment/intervention could be administered with virtually no additional investment of time. The primary cost associated with an assessment/intervention would be the cost of any injury prevention devices installed.

One hundred and nine homes were assessed in this study. All of the homes were

SFC Program participant homes within the Redding District, which encompasses the 10 northernmost counties in California. Each participant had requested water or wastewater facilities from IHS. During the assessment, the condition of the home prior to any intervention was recorded. Thus, the pre-intervention data represent the condition of SFC participant homes without the IHS home safety assessment/intervention, and the post-assessment/intervention data represent the condition of SFC participant homes after assessment/intervention.

Each home safety assessment/intervention was performed by one of the three Redding District SFC engineering technicians. The technicians were trained to follow identical assessment/intervention procedures. Each technician received a *Home Safety Handbook*, in which a collection of articles provided in-depth information on each topic addressed by the assessment/intervention.

Homeowners were asked to sign the assessment/intervention form to verify the information collected. For quality control purposes, an engineering student intern reassessed 30 homes to validate the accuracy of the data. The assessments/interventions were performed from April through December 1998.

Data

To evaluate the effectiveness of the program, the statuses of three items on the IHS Home Safety Assessment/Intervention Form were tracked before and after assessment/intervention: presence of an operable smoke detector; presence of a fire extinguisher; and presence of a first-aid kit. These three items were chosen for tracking because they constituted clear, objective measures of the impact the assessments/interventions were having, and because they are recognized as sound injury control practices.

The amount of time required to perform each assessment/intervention was recorded on the form. These data were used to assess the additional workload involved in delivering the program.

Results

Data representing the pre-intervention condition of the homes are shown in Table 1. Figure 2 shows the percentages of assessed homes with risk factors, including the presence of children, smokers, or adults over 60 years of age.

The results of the program evaluation are illustrated in Figure 3. The prevalence of assessed homes with working smoke detectors rose from 58 percent to 96 percent. The prevalence of homes with a mounted, working fire extinguisher rose from 33 percent to 98 percent, and the prevalence of homes with a first-aid kit rose from three percent to 99 percent.

The additional technician workload created by incorporating the home safety program into the SFC program is reflected in the time required to conduct the assessment/intervention. The time ranged from five minutes to 45 minutes, with the average assessment/intervention taking 18 minutes. Travel time from office to site ranged from 15 minutes to five hours, with an average travel time of 3.42 hours.

Figure 4 shows the prevalence of working and nonworking smoke detectors according to risk factors such as the presence of smokers, children, or older adults. About 13 percent of assessed homes had smoke detectors that did not work.

Figure 5 shows the prevalence of working and nonworking smoke detectors according to type of home. Owner-financed new homes had the highest prevalence of smoke detectors, followed by government-financed new homes. Already-existing homes had the lowest prevalence of smoke detectors.

The reassessment of 30 homes by an engineering student intern validated the accuracy of the assessment/intervention data collected by the technicians. For virtually every home, the data on presence and absence of injury prevention devices matched.

Discussion

Before assessment/intervention, the prevalence of smoke detectors in this study was only 58 percent (Figure 3). By comparison, the 1995 national prevalence was 93.6 percent, and the prevalence among California households was 92.7 percent (8). Assessment/intervention raised the prevalence of smoke detectors to 96 percent among homes in the study. This change means significant safety gains, since smoke detectors may reduce the risk of residential fire death by about 40 percent (9).

Children under 15 years of age make up 33 percent of the American Indian population; by comparison, children constitute only 22 percent of the general population (6). This study found children in 61 percent of

FIGURE 2

Percentages of Homes with Various Risk Factors

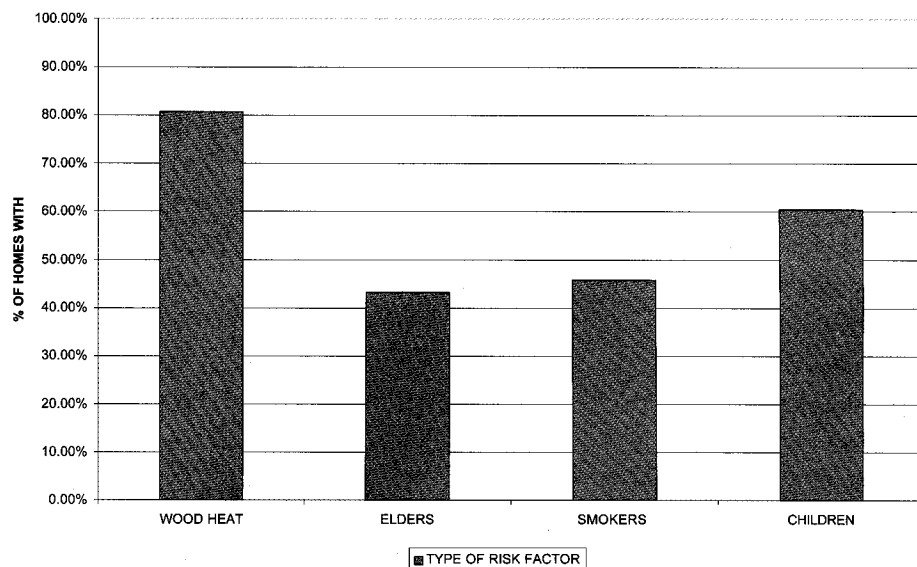
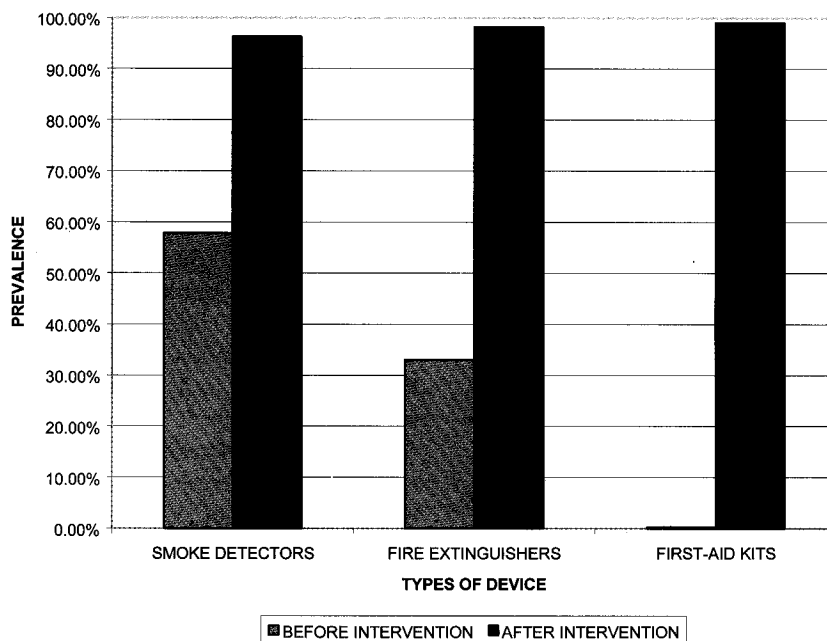


FIGURE 3

Presence of Injury Prevention Devices in Homes Before and After Intervention



assessed homes and adults over 60 years of age in 43 percent of assessed homes. Children younger than six years of age and adults older than 65 years of age have a fire-death rate two to six times greater than the national average for all ages (10). In 1991, residential fires were the second leading cause of injury deaths for children between

one and 10 years of age and the sixth leading cause of injury deaths for adults over 65 years of age (11). Approximately 90 percent of fire-related deaths among children under five years of age take place in homes without a functioning smoke detector (12). As shown in Figure 4, homes with children had a slightly lower prevalence of smoke detectors

FIGURE 4

Smoke Detector Prevalence by Type of Risk Factor

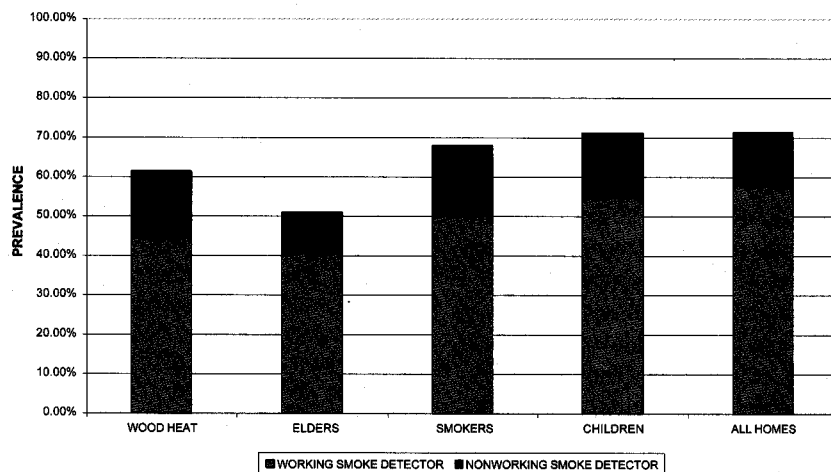
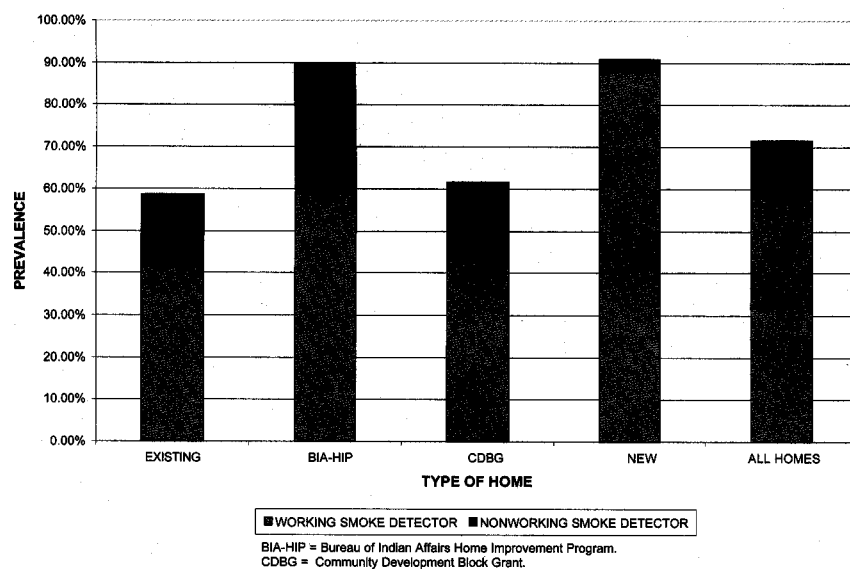


FIGURE 5

Smoke Detector Prevalence by Type of Home



than did the total of homes assessed. Homes with older adults had the lowest prevalence of smoke detectors.

From 1991 to 1995, U.S. residential fire-related death rates were greatest from December through February and lowest from June through August (3). This seasonal variation has been attributed in part to the use of heating devices such as wood stoves and portable space heaters (8). For 1990, the National Fire Incidence Reporting System (NFIRS) ranked heating devices as the second leading cause of deaths among children

and older adults from fires with known causes, and, in general, cooking and heating devices were reported to be the most common cause (39 percent) of residential fires (13,14). In this study, wood stoves or portable kerosene heaters were the reported heat sources for 81 percent of assessed homes. As shown in Figure 4, homes with wood heat had a lower prevalence of smoke detectors than did the total of homes assessed.

Smokers resided in 46 percent of the homes in this study. NFIRS data indicate that

careless smoking was the leading cause of fire death among older adults in 1991 (13). Smoking also was found to be the ignition source of 23 percent of all house fires that resulted in death in 1991 (7).

For 1990, NFIRS ranked faulty or misused electrical distribution sources (e.g., wiring, transformers, meter boxes, outlets, cords, plugs, and lighting fixtures) as the third leading cause of deaths among children and older adults from fires with known causes (13). Thirty-two percent of the homes in this study presented electrical problems, including faulty wiring, overloaded circuits, frayed electrical cords, arcing in circuit boxes, and failure to meet the requirements of the Uniform Electrical Code. During assessments, any electrical concerns were brought to the attention of homeowners.

Since installation of the devices was part of the assessment/intervention program, it was expected that postassessment tracking would find an increase in the prevalence of injury control devices. Homeowners expressed more willingness to have the safety assessment/intervention performed after learning that the technician would be installing the devices if needed. The major reason that the post-assessment/intervention prevalence of safety devices was not 100 percent was that a few homeowners simply did not want the devices in their homes. Four homeowners did not want smoke detectors for fear of nuisance alarms. Two homeowners did not want fire extinguishers, one homeowner expressed fear of fire extinguishers, and one homeowner did not want the first-aid kit.

The majority of each assessment/intervention took place during normal site evaluation activities, particularly when the technician was verifying that the participant's home met the standard home definition that would qualify it for sanitation facilities services under Public Law 86-121. The average time required to perform an assessment/intervention was only 18 minutes; however, not all of the assessments/interventions could be performed within the parameters of existing activities or during standby time. In addition, the assessment/intervention program generated extra administrative work, with forms to be filed and inventories of injury devices to be tracked. The extra administrative work took 15 to 30 minutes each week. No extra travel time was attributed to the assessment/intervention program, since the technicians had to travel to the sites to perform their normal work anyway. Rather,

combining the assessments/interventions with SFC work constituted an economy of time. The 18 minutes required for each assessment/intervention were nominal compared with the 3.42 hours that already were being invested per site. None of the technicians stated that performing the assessments/interventions noticeably added to their workloads by causing inconvenience or delays in their regular duties.

The purchase of the smoke detectors, fire extinguishers and first-aid kits was the major cost of the program. The CAIHS Injury Prevention Program provided the devices for the study. Each smoke detector cost \$8.99, each fire extinguisher cost \$18.41, and each first-aid kit cost \$10.31. Per site, the average cost for injury prevention devices was \$25.12. If the 18 minutes per site is tallied exclusively as an assessment/intervention cost, then the cost in terms of technician salaries was \$6 per site. The additional administrative work cost about \$3 per site. Therefore, the cost of implementing this program was less than \$35 per home.

It is recommended that the checklist used for this study be expanded into a more comprehensive safety assessment. The Bemidji Area IHS has a Home Safety Checklist pilot program conducted by public health nursing staff on the Fond du Lac Indian Reservation (4). The checklist used in that program is longer and more in-depth. The Bemidji program therefore has a wider variety of injury control devices to distribute, including trigger locks, nightlights, syrup of ipecac, cabinet locks, and grab bars for elders (4). In Northern California, an assessment/intervention program that covered additional devices might have a greater positive impact, but the cost would be higher.

Most of the CAIHS engineers and technicians involved support this assessment/intervention program, particularly in light of the low cost, the little time involved, and the impact of injuries on Indian people. An incident that occurred in March of 1999 solidified support for the program in the Redding District: A Bureau of Indian Affairs Home Improvement Program (BIA-HIP) home that had received sanitation facilities from the SFC office in 1997 (before the assessment/intervention program began) burned down. The fire killed all the occupants.

Home safety assessments/interventions have the potential to contribute to public education and awareness of injury prevention because, in this program, IHS personnel talk

personally, one on one, to each participant. Not only do participants become aware of injury risks in their homes, but they also learn about injury prevention issues and the effects of injury on the American Indian population as a whole. Health education in the form of pamphlets, brochures, and referrals also could be tailored to clients' specific concerns.

Conclusion

This study showed that IHS can conduct a home safety assessment/intervention program in conjunction with the usual operation of the SFC Program. Existing SFC Program staff can be used with negligible additional demands on resources such as money and time. Home safety assessments/interventions can be performed in an average of less than 20 minutes per site. The addition of this service to the IHS environmental health program increases the effectiveness and efficiency of the program with respect to its mission, which is to raise the health status of American Indians and

Alaska Natives to the highest possible level. The added home safety assessment/intervention activity makes the SFC Program more effective and more efficient since two tasks are performed at once. Because injuries are a leading cause of death, other health programs that involve home visits should attempt to incorporate this valuable service. 🚒

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